

CLAIMS

What is claimed is:

- 1 1. A process for forming a thermally stable low-dielectric
2 constant material, the process comprising:
3 preparing a gas mixture to form a fluorinated amorphous carbon
4 (a-C:F) material; and
5 mixing said gas mixture with a boron-containing gas.
- 1 2. The process of claim 1 wherein mixing said gas mixture with
2 said boron-containing gas includes forming a boron-doped-fluorinated-
3 amorphous-carbon (a-C:B:F) material.
- 1 3. The process of claim 1 wherein said gas mixture comprises
2 hydrocarbon, fluorocarbon, boron-containing gas, and an inert gas.
- 1 4. The process of claim 1 wherein said boron-containing gas
2 comprises one of diborane (B_2H_6) and boron trifluoride (BF_3).
- 1 5. The process of claim 1 wherein said boron-containing gas is
2 mixed to said gas mixture after said a-C:F material is formed by
3 chemical vapor deposition (CVD) techniques.
- 1 6. The process of claim 1 wherein said boron-containing gas is
2 mixed to said gas mixture after said a-C:F material is formed by
3 reactive sputtering techniques.
- 1 7. The process of claim 2 wherein said a-C:B:F material is
2 formed by chemical vapor deposition techniques.
- 1 8. The process of claim 2 wherein said a-C:B:F material is

2 formed by reactive sputtering techniques.

1 9. The process of claim 2, wherein said a-C:B:F material has
2 an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

1 10. A dielectric material comprising a-C:B:F material.

1 11. The dielectric material of claim 10, said a-C:B:F material
2 has an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

1 12. A process for providing an interconnect structure with low
2 capacitance, the process comprising:

3 patterning at least two metal lines upon a substrate; and
4 forming an a-C:B:F material between said at least two metal
5 lines.

1 13. The process of claim 12, wherein said a-C:B:F material is
2 formed by the process comprising:

3 preparing a gas mixture to form a fluorinated amorphous carbon
4 (a-C:F) material; and
5 mixing said gas mixture with a boron-containing gas.

1 14. The process of claim 12 wherein said a-C:B:F material is
2 formed by chemical vapor deposition techniques.

1 15. The process of claim 12, wherein said a-C:B:F material has
2 an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

1 16. A process for providing an interconnect structure with low
2 capacitance, the process comprising:

3 forming an a-C:B:F material upon a substrate;

4 patterning at least two trenches in said a-C:B:F material; and
5 forming metal into said at least two trenches.

1 17. The process of claim 16, wherein said a-C:B:F material is
2 formed by the process comprising:

3 preparing a gas mixture to form a fluorinated amorphous carbon
4 (a-C:F) material; and
5 mixing said gas mixture with a boron-containing gas.

1 18. The process of claim 16 wherein said a-C:B:F material is
2 formed by chemical vapor deposition techniques.

1 19. The process of claim 16, wherein said a-C:B:F material has
2 an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

1 20. A process for providing an interconnect structure, the
2 process comprising:

3 forming an a-C:B:F barrier layer on a low-k material of a
4 substrate; and
5 forming a metal layer on said a-C:B:F barrier layer.

1 21. The process as described in claim 20 wherein said a-C:B:F
2 barrier layer is formed, by way of chemical vapor deposition
3 techniques.

1 22. A process for providing an interconnect structure with the
2 process comprising:

3 forming a metal layer upon a substrate;
4 patterning said metal layer;
5 forming an a-C:B:F barrier layer onto said metal layer; and,

6 forming a low-k material onto said a-C:B:F barrier layer.

1 23. The process as described in claim 22 wherein said a-C:B:F
2 barrier layer is deposited by way of chemical vapor deposition
3 techniques.

1 24. A process for providing an interconnect structure with the
2 process comprising:

3 forming a low-k material upon a substrate;
4 forming an a-C:B:F barrier layer onto said low-k material; and
5 forming a metal layer onto said a-C:B:F barrier layer.

1 25. The process as described in claim 24 wherein said a-C:B:F
2 barrier layer is formed by way of chemical vapor deposition
3 techniques.

1 26. A process for patterning a low-k material by a hardmask,
2 the process comprising:

3 forming said low-k material upon a substrate;
4 forming a-C:B:F upon said low-k material;
5 patterning said a-C:B:F to define an a-C:B:F pattern; and,
6 patterning a portion of said low-k material according to said a-
7 C:B:F pattern.

1 27. The process as described in claim 26 wherein said portion
2 of said material is patterned by way of hydrogen-based reactive ion
3 etching.

1 28. The process as described in claim 26 wherein said a-C:B:F
2 is formed by way of chemical vapor deposition techniques.

1 29. A process for creating a pattern on an underlying material
2 comprising:

3 forming said underlying material on a substrate;

4 depositing an anti-reflective coating (ARC), said anti-
5 reflective coating being comprised of a-C:B:F;

6 forming a patterned photoresist layer on said anti-reflective
7 coating; and,

8 forming a pattern in said anti-reflective coating and said
9 underlying material according to said patterned photoresist layer.

1 30. The process as described in claim 29 wherein said a-C:B:F
2 is formed by way of chemical vapor deposition techniques.